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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

In re application of:)
Ayazi, et al.)
Serial Number: 10/632,176)
Filed: July 31, 2003)
Title: Capacitive Resonators and Methods of)
Fabrication)
Attorney Docket No. 062020-1440

**PETITION UNDER 37 C.F.R. § 1.47 TO ACCEPT FILING OF APPLICATION MADE
ON BEHALF OF CO-INVENTOR WHO CANNOT BE FOUND OR REACHED AFTER
DILIGENT EFFORT**

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Farrokh Ayazi, as one of the co-inventors of the invention embodied in the above-referenced patent application, hereby petitions to accept the filing of U.S. utility application, having serial no. 10/632,176, filed on July 31, 2003, said filing made on behalf of co-inventor Seong Yoel No. Mr. Ayazi was advised that, as a co-inventor, his signature along with the other co-inventors on the declaration filed with the application, with the signature block for the unavailable inventor left blank, is treated as having been signed by all the available joint inventors on behalf of the non-signing inventor, Mr. No., pursuant to 37 C.F.R. § 1.47 and MPEP 409.03(a). Mr. Ayazi was further advised that at the time of filing the application and as of the date of this petition, Mr. No could not be found or reached after diligent effort.

Pursuant to 37 C.F.R. § 1.47, a copy of the filed declaration is enclosed along with proof that the non-signing inventor cannot be reached, the required fee under 37 C.F.R. § 1.17 (h), and the last known address of the non-signing inventor.

In response to the guidance provided by the Office of Petitions, and as required by MPEP 409.03 (d), Petitioner submits the following in an effort to address the suggestions of MPEP 409.03 (d):

- a. A Statement of Facts signed by a person having firsthand knowledge that fully describes the facts which are relied on to establish that a diligent effort was made. (see Exhibit A)
- b. A copy of the executed declaration by the co-inventors of the pending application (see Exhibit B).
- c. An amended copy of the page of the declaration corresponding to the non-signing inventor, which includes the last known address of the unavailable inventor. (Exhibit C)
- d. A supplemental page for the Declaration. (Exhibit D)
- e. Copies of documentary evidence as follows:
 - Certified mail to the last known address of Seong Yoel No. (see Exhibit E)
 - An Internet search on the inventor. (see Exhibit F)
 - E-mail to last known e-mail addresses of Seong Yoel No. (Exhibit G)
 - An employment agreement of Seong Yoel No to assign IP rights. (See Exhibit H)

Insofar as Petitioner has met all of the requirements of MPEP 409.03(d), Petitioner respectfully requests the granting of this petition.

No additional fee is deemed to be payable in connection with this response other than those fees included with this response. Should any additional fee be required, you are hereby authorized to charge any such additional fee to Deposit Account No. 20-0778.

Respectfully submitted,



Scott A. Horstemeyer, Reg. No. 34,183

THOMAS, KAYDEN, HORSTEMEYER & RISLEY, L.L.P.
Suite 1750
100 Galleria Parkway N.W.
Atlanta, Georgia 30339
(770) 933-9500



Exhibit "A"
IN THE UNITED STATES PATENT & TRADEMARK OFFICE

In re application of:)
Ayazi, et al.)
Serial Number: 10/632,176)
Filed: July 31, 2003)
Title: **Capacitive Resonators and Methods of**)
Fabrication)
Attorney Docket No. 62020-1440
)

**STATEMENT OF FACTS REGARDING INVENTOR WHO CANNOT BE FOUND OR
REACHED AFTER DILIGENT EFFORTS**

I, Ryan N. Kelley, declare that:

A. I am the Technology Marketing Assistant for Georgia Tech Research Corporation. In this capacity, I am authorized to act on behalf of Georgia Tech Research Corporation in connection with its patent and other intellectual property matters.

B. I have made several unsuccessful requests of Seong Yoel No, the co-inventor of the above-referenced patent application, to sign a declaration relating to the current application. These attempts, made contemporaneously to the filing, include the following:

- (1) I made a phone call to the number listed with the last known address listed with Georgia Tech (770-448-5343), which was a disconnected number.
- (2) I performed a Google Search on the World Wide Web (www) on the inventor's name, which yielded no new information as to his location.

(3) I sent a letter via Certified Mail to Mr. No requesting Mr. No contact GTRC, and the letter was returned to our office as undeliverable. This letter was sent to the last known address at 3830 Ancroft Circle, Norcross GA. 30092.

(4) I made a phone call to the emergency contact, Il Young No, at 703-824-0187, which also was a disconnected number.

(5) I sent emails to the last known address, all of which were returned as undeliverable.

C. I aver, on information and belief, that Georgia Tech Research Corporation owns all right, title, and interest in this invention and patent application by an employment agreement executed by Seong Yoel No on September 22, 2000 and submitted for recording on the date herewith, and by an assignment executed on July 31, 2003, submitted for recording at the USPTO on 7/31/2003.

D. I aver, on information and belief, that Seong Yoel No can neither be located nor contacted to sign a declaration related to the current application.

E. I aver, on information and belief, that the declaration for the application was submitted with all co-inventors signing and the signature block for Seong Yoel No left blank, which pursuant to 37 C.F.R. § 1.47 and MPEP 409.03(a) is treated as having been signed by all the available joint inventors on behalf of the nonsigning inventor, Seong Yoel No.

F. I aver, on information and belief, that the last known address of Seong Yoel No, which was not listed in the declaration, is 3830 Ancroft Circle, Norcross, Georgia 30092.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statement and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

11/12/03
Date

Ryan N. Kelley
Ryan N. Kelley



EXHIBIT "B"

DECLARATION FOR PATENT APPLICATION

Attorney Docket No: **062020-1440**

As the below named inventor(s), I/we hereby declare that:

Our residences, post office addresses and citizenships are as stated below next to our names.

We believe we are the original, first, and joint inventors of the subject matter which is claimed and for which a patent is sought on the invention **CAPACITIVE RESONATORS AND METHODS OF FABRICATION**, the specification of which:

- is attached hereto.
 was filed on as _____ Application Serial No. _____.
 was filed on _____ under U.S. Express Mail No. _____.
 is set forth in PCT International Application No. _____;
filed on _____ and as amended Under PCT Article 19 on _____ (if any).

I/we hereby state that I/we have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I/we hereby claim foreign priority benefits under Title 35, United States Code, 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America listed below and have also identified below any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed: **NOT APPLICABLE**.

I/we hereby appoint all attorneys and agents of Thomas, Kayden, Horstemeyer & Risley, LLP, who are listed under the USPTO Customer Number shown below as my/our attorneys and agents to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith, recognizing that the specific attorneys and agents listed under that Customer Number may be changed from time to time at the sole discretion of Thomas, Kayden, Horstemeyer & Risley, LLP, and request that all correspondence be addressed to the address filed under the same USTPO Customer Number.

24504

Please address all telephone calls, in the first instance, to **Scott A. Horstemeyer** at telephone number: (770) 933-9500.

Address all correspondence to:

**Scott A. Horstemeyer
THOMAS, KAYDEN, HORSTEMEYER
& RISLEY, L.L.P.
100 Galleria Parkway, N.W., Suite 1750
Atlanta, Georgia 30339-5948**

I/we hereby declare that all statements made herein of my/our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statement and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of First Inventor: Farrokh Avazi

Residence: 1130 Piedmont Avenue, #612, Atlanta, Ga. 30312

Citizenship: Iran

Post Office Address: _____

Inventor's Signature: Farrokh Avazi

Date: July 25th, 2002

Full Name of Second Inventor: Siavash Pourkamali Anaraki

Residence: Sahel Apts. A. Piroozan Shomali St. Hormozan St. Shahrak Gharb. Tehran, Iran.
14666

Post Office Address: _____ Citizenship: Iran

Inventor's Signature: S. PourKamali

Date: July 30th, 2003

Full Name of Third Inventor: Seong Yoel No
Residence: Unknown Citizenship: S. Korea

Post Office Address: _____

Inventor's Signature: _____ Date: _____

EXHIBIT "C"

Full Name of Second Inventor: Seong Yoel No
Residence: 3830 Ancroft Circle, Norcross, GA 30092 Citizenship: S. Korea
Post Office Address: same as above

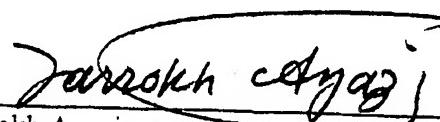
Inventor's Signature: _____ Date: _____

EXHIBIT "D"

Supplemental Page for Declaration For Signature By Co-Inventor
On Behalf of Inventor Who Cannot Be Found or Reached After Diligent Effort

1. I, Farrokh Ayazi, am one of the inventor for the subject matter of the application having serial number 10/632,176. I am advised that Seong Yoel No cannot be found or reached after diligent effort to sign the declaration for this patent application. As a co-inventor, I am advised that I am authorized to take this action.
2. I have signed the declaration on July 25, 2003, both in my capacity as an inventor, and on behalf of Seong Yoel No, who cannot be found or reached after diligent effort. Since Seong Yoel No cannot be found, this action was necessary to preserve the rights of the remaining parties to this application or to prevent irreparable damage to us.

Date: 11/18/03



Farrokh Ayazi


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Seong Yoel No

Google Search

EXHIBIT "F"

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 Searched the web for **Seong Yoel No**.

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[Farrokh Ayazi--Assistant Professor](#)

... Current Students. **Seong Yoel No**: BS in Electrical Eng. from Rensselaer Polytechnic Institute, Troy, NY, 1996; MS in Electrical Eng. ...
users.ece.gatech.edu/~ayazi/00students.html - 5k - [Cached](#) - [Similar pages](#)

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... Michael Cornelius, Andrew Dickens SiGe technology Tom Krawczyk, Matt Ernest, Rupal Patel Steve Carlough, SiGe technology Yu Huang, **Seong Yoel No**, JianYu Deng ...
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... JOURNAL OF MICROELECTROMECHANICAL SYSTEMS, VOL. 9, NO. 3, SEPTEMBER 2000;
Se ng Yoel No, Akinori Hashimura, Siavash Pourkamali, Farrokh Ayazi. ...
www-mtl.mit.edu/research/mems-salon/list.html - 38k - [Cached](#) - [Similar pages](#)

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... Alpharetta, GA. (770)772-7424. 1055, **No**, Song Jun, 1211 Mayfield Dr. Decatur, GA.
 (770)493-7955. 1056, Noh, **Seong Yoel**, 3830 Ancrott Cir. Norcross, GA. (770)448-5343. ...
www.koreanatl.com/haninlok/h11.htm - 52k - [Cached](#) - [Similar pages](#)

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... **Seong Yoel No** BS in Electrical Eng. from Rensselaer Polytechnic Institute, Troy, NY, 1996 MS in Electrical Eng. from Rensselaer ...

magnet.mirc.gatech.edu/mems/Students/ master_list_students.htm - 17k - [Cached](#) - [Similar pages](#)

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... DSES CII 5223 campus ostroa Aleksander Ostrogorsky ME AE & M JEC 2049 campus duttap Partha S. Dutta ME AE & M JEC 2049 campus nos **Seong Yoel No** ECSE 6015 CII ...
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... of Applied Sciences, Germany 1340-1400 The HARPSS Process for Fabrication of Nano-Precision Silicon Electromechanical Resonators **Se ng Y el No** and Farrokh ...

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Microchip Names (N)

... BONG SUN NO DAEHEANG NO DR NO HEE SUN NO HIJUNG NO HYUN-JEONG NO IL YONG NO KEUMJA

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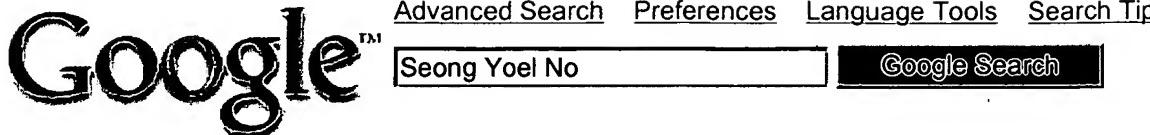
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... Pyeoung Kee Kim, Hankyu Lim, Kyu Young Rho, Kang Yoon Lee, and **Seong Mook Kim** ... 7. Jin Hak Bae, Pyeoung Kee Kim, Jong **Yoel** Yang and Hang Joon Kim,"On-line ... 7, No. ... major.silla.ac.kr/computer/prof/ prof_list4.php?code=prof - 16k - [Cached](#) - [Similar pages](#)

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... KOREA, INC Actuators (parts) || Bruce J.Freymann **no**; ... Actuators (parts) || KIM, DONG-YOEL; ASIANA AIRLINES OTHER PARTS ... BAEK, NAM-GUK; BO **SEONG** CORPORATION Actuators ... search.kotis.net/dir/ecompany/7/ - 101k - [Cached](#) - [Similar pages](#)

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The KAIST Herald

... The former president of the 17th Student Council, Jong-**yoel** Lee resigned due to ... students, the number of people applied to join the tournament was **no** less than ...
herald.kaist.ac.kr/news.html - 25k - Jul 28, 2003 - [Cached](#) - [Similar pages](#)

The KAIST Herald

By Mi-kyung Han. The former president of the 17th Student Council, Jong-**yoel** Lee resigned due to embezzlement from SK Telecom and Sungmoon Education. ...
herald.kaist.ac.kr/news/0306n9.html - 16k - Jul 28, 2003 - [Cached](#) - [Similar pages](#)

Welcome to Jen Sheen's Lab

... Park, Jae Hyuk Yoo, Yun Hwan Kang, **Seong** Cheol Koo, Yoon Duck Koo,.. ... Hagit Niv, Orit Gutman, **Yoel** Kloog, and Yoav I. Henis. ... Trends in Cell Biology, Vol 12 (**No** ... weeds.mgh.harvard.edu/sheenweb/journal_club/may.2002.html - 52k - [Cached](#) - [Similar pages](#)

Book Reviews

... Lee Mun-**yoel**'s "Our Twisted Hero" and Kim Kwang-kyu's "The ... Lee Bo-l, Kim Su-ja, and **No** Sang-kyon are ... by Kim Dae-hyeon, Simultaneity by Kim **Seong**-suk, and The ...
www.sogang.ac.kr/~anthony/klt/99summer/scene.htm - 11k - [Cached](#) - [Similar pages](#)

Lee, Min Hwa scholarship was donated by Lee, Min Hwa, the alumnus ...

... 5. Kook-**yoel** Yoo and Jae-kyoon Kim, "An efficient coding method for the local motion vector by using global motion", IEEE ... Dept. Student ID **No**. ... **Seong** Cheol Huh. ...
www.eecs.kaist.ac.kr/bk_eng/ebk02_rep02_d.htm - 79k - [Cached](#) - [Similar pages](#)

Patentee Index

... 379-433.13. Kim, Jae-Y el; Park, Chang-Soo; Kang, Hee-Won; Kong, Jun-Jin; **No**, Jong-Seon ... 358-400. Oh, Soo-yeul; and Jang, Ki-**seong** 06438357 Cl. 455-67.4. ...
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... final SYDNEY.— Dinamarca ha sido la campeona del torneo femenino de balonmano ... realizadora, con siete goles, los mismos que ha conseguido anotar Seong-Ok Oh ...

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나재웅~문일웅

1001	Na, Jae Woong	207 Lakes Dr. Atlanta, GA	(770)801-0162
1002	Na, Chae Ho	804 Lake Ridge Lane Dunwoody, GA	(770)458-7126
1003	Na, Jong Woo	4251 Bonaparte Dr. Tucker, GA	(770)934-2284
1004	Na, Chang	6005 State Bridge Rd. Duluth, GA	(770)814-8784
1005	Na, Hosong	2655 Shadow Woods Cir. Marietta, GA	(770)971-2893
1006	Ra, Hong San	3461 Valley View Dr. Marietta, GA	(770)973-4075
1007	Nam, Kun Ju	5167 Buford Hwy. Doraville, GA	(770)458-7398
1008	Nam, Kyung Hee	859 Steffi Ct. L'ville, GA	(770)338-8777
1009	Namkoong, Kyu	3061 Oakcliff Rd. #164 Doraville, GA	(770)455-9333
1010	Nam, Kwan Il	3410 Ennfield Ln. Duluth, GA	(770)622-6437
1011	Nam, Kee Man	3429 Chaselton Ct. Duluth, GA	(770)476-7912
1012	Nam, Ki Soul	9545 Kingston Crossing Cir. Alpharetta, GA	(770)447-0599
1013	Nam, Gi Jung	3355 McDaniel Rd., NW. Duluth, GA	(678)473-9659
1014	Nam, Kee Chul	8690 Lake Glen Court Alpharetta, GA	(770)998-2681
1015	Nam, Kee Tae	3300 Wintree Dr. Norcross, GA	(770)446-8449
1016	Nam, Keeho	4867 Ashford Dunwoody Rd., #6203 Dunwoody, GA	(770)394-8693
1017	Nam, Ki Ho	915 Bream Ct. Atlanta, GA	(770)836-4810
1018	Nam, Kee Hoon	6185 Buford Hwy., #E-300 Norcross, GA	(770)368-9978
1019	Nam, Duk Hyun	1900 Glenn Club Dr. S.W. Stone Mountain, GA	(770)879-8119
1020	Nam, Buhm Jin	615 Ashtree Path Alpharetta, GA	(770)664-6203

1021	Nam, Beong T.	1695 Graves Rd. #1612 Norcross, GA	(770)449-7949
1022	Nam, Byung Hwa	2445 Rex Rd., #Z-6 Ellenwood, GA	(770)968-0847
1023	Nam, Bong U.	578 Delphinium Blvd., NW Acworth, GA	(770)591-7289
1024	Nam, Sang Moo	1208 Tree Summit Pkwy. Duluth, GA	(770)622-4087
1025	Nam, Sang Ik	2501 Shadowodd Pkwy. Atlanta, GA	(770)690-9987
1026	Nam, Seon	2951 N. Dekalb Dr. #205 Doraville, GA	(678)530-9977
1027	Nam, Se Hwan	239 Village Dr. McDonough, GA	(770)914-7704
1028	Nam, Young Mi	6305 Dunleaf Arc Way Norcross, GA	(770)921-5002
1029	Nam, Young Cha	315 Kempton Ct. Alpharetta, GA	(770)663-1358
1030	Nam, Young Ho	2035 Penny Ln. Marietta, GA	(770)919-8456
1031	Nam, Ok Chu	2583 Rex Rd. Ellenwood, GA	(770)961-1778
1032	Nam, Yoon Ok	3788 Berkeley Crossing Duluth, GA	(770)622-2223
1033	Nam, Yun W.	311 Ridge Brook Tr. Duluth, GA	(770)662-5943
1034	Nam, Eung Woo	1121 Steeple Run Lawrenceville, GA	(770)995-6463
1035	Nam, Ik Song	202 Birchmore Walk Lawrenceville, GA	(770)682-0279
1036	Nam, Joon Woo	201 Birchmore Walk Lawrenceville, GA	(770)682-0279
1037	Nam, Jin Sang	345 Tumbling Creek Dr. Alpharetta, GA	(678)297-9898
1038	Nam, Jeen Woo	1130 Allgood Rd. Marietta, GA	(770)977-1232
1039	Nam, Chon U.	2424-E Dunwoody Crossing Atlanta, GA	(770)986-8373
1040	Nam, Hak Sik	1130 Allgood Rd. Marietta, GA	(770)977-1232
1041	Nam, Hae Ja	2424-#E Dunwoody Crsg. Alpharetta, GA	(770)986-8373
1042	Nam, Hyo Jeam	3165-D Chestnut Dr. Doraville, GA	(770)986-7037
1043	Namgoong, Daniel	3303 Ellsmere Trace Marietta, GA	(770)579-0568

1044	Namkoong, Young	7048 Shore Rd. Lithonia, GA	(770)498-5993
1045	Namkoong, Jun	6015 State Bridge Rd., #2202 Duluth, GA	(770)622-1610
1046	No, Kyung Yol	3607 Regency Park Dr. Duluth, GA	(678)475-9448
1047	No, Kwang Jun	3137 Lynnray Dr. Doraville, GA	(770)493-1451
1048	No, Ki Sook	2802 Cambridge View Dr. Duluth, GA	(770)849-0929
1049	Roh, Dong Chul	621 Penny Ln., SE Marietta, GA	(770)426-1838
1050	Noh, Lomi	1946 Chartridge Ct. Dunwoody, GA	(770)671-8426
1051	Rho, Byung Cho	1809 Lamp Post Ln. Lawrenceville, GA	(770)963-8128
1052	Noh, Byung Chan	839 Biscayne Way Suwanee, GA	(770)614-7112
1053	Rho, Byung C.	201 Laurel Forest Cir. Atlanta, GA	(404)814-1205
1054	Ro, Sung Woo	935 Tresillian Ct. Alpharetta, GA	(770)772-7424
1055	No, Song Jun	1211 Mayfield Dr. Decatur, GA	(770)493-7955
1056	Noh, Seong Yoel	3830 Ancrott Cir. Norcross, GA	(770)448-5343
1057	Noh, Young Soo	905 Ballentree Ct. Alpharetta, GA	(770)667-0619
1058	No, Ok Joo	3529 Durden Dr. #L Atlanta, GA	(770)451-6358
1059	Ro, Eun Sik	4654 Webster Way Acworth, GA	(770)917-9995
1060	Noh, Eun Joo	2124 River Chase Trail Duluth, GA	(678)475-1242
1061	Ro, Ik Han	2608 Park Colony Dr. Norcross, GA	(770)723-0242
1062	Ro, Chung Rai	130 Springwater Trace Woodstock, GA	(770)926-9963

1063	No, Jong Op	1601 Bridge Mill Dr. S.E. Marietta, GA	(770)953-0540
1064	Noh, Chun Jin	1025 Kibbe Cir. L'ville, GA	(770)806-8190
1065	Row, Chi Sung	3760 Grand Forest Dr. Norcross, GA	(770)441-7962
1066	Noh, Tae Kyun	1490 Willow Lake Dr. Atlanta, GA	
1067	No, Tae Young	2552-D South Cobb Dr. Smyrna, GA	(770)805-9922
1068	No, Hyun	3353 Riverheight Crossing Marietta, GA	(770)956-8322
1069	Row, Wha Suk	4599 Bogie Rd. Duluth, GA	(770)447-4159
1070	No, Hwan Chun	3384 Shallowford Rd. Chamblee, GA	(770)458-7145
1071	No, Hong Jun	1360 McLendon Dr. Decatur, GA	(770)491-6479
1072	Lee, You Jin	235 Lake Knoll Dr. Lilburn, GA	(770)931-8620
1073	Daup, Kil Hyon	87 Old Mill Ct. Acworth, GA	(770)966-1411
1074	David Park	3969 Timberbrook Ln. Marietta, GA	
1075	Dong, Yoon Keum	3512-L Durden Dr. Atlanta, GA	(770)564-1603
1076	Lei, Yun Teh	5420 Durham Ridge Ct., NW Lilburn, GA	(770)717-2848
1077	Ryu, In Gwon	161 Canyon Dr. Bowersville, GA	(706)376-1604
1078	Ryu, Jong Sang	3217-H Flowers Rd. S. Atlanta, GA	(770)218-9603
1079	Yu, Jung Kul	4180 Oak Crest Dr. Tucker, GA	(770)939-2750

1080	Lim, Soo Nah	3100 River Exchange Dr. Norcross, GA	(770)416-8865
1081	Lim, Soo Woong	3026 N. Brook Dr. Atlanta, GA	(770)934-4970
1082	Ma, Song Hui	4950 Happy Hollow Rd. Dunwoody, GA	(770)457-8860
1083	Ma, Soo Mi	P.O. Box 80545 Atlanta, GA	(770)455-6581
1084	Mo, Chul In	1541 Annapolis Way Grayson, GA	(678)344-7101
1085	Moon, Kwang Soo	707 Park Colony Dr. Norcross, GA	(770)934-8135
1086	Mun, Kyu Sup	1235 Fairfield Dr. Marietta, GA	(770)971-5108
1087	Steve Moon	3060 Boulder Crest Ellenwood, GA	(404)243-3612
1088	Mun, Kil Won	2540 Johnson Dr. Doraville, GA	(770)248-0766
1089	Moon, David H.	74 Leighs Grove Way Grayson, GA	(770)682-5812
1090	Mun, Tok Cha	4185 Devon Wood Ct. Tucker, GA	(770)270-1719
1091	Moon, Mi Hui	2085 S.Milledge Ave., #124 Athens, GA	(706)208-9956
1092	Moon, Byung Tae	2850 Delk Rd. 44E Marietta, GA	(770)953-8206
1093	Moon, Byung Ha	400 Oakmont Cir. SE. Marietta, GA	(404)525-5722
1094	Moon, Byung Ho	462 Manor Oak Ln. Marietta, GA	(770)955-2599
1095	Moon, Boo Chun	170 Cross Creek Dr. Lilburn, GA	(678)380-9458
1096	Moon, Sang Ho	1120 Vintage Club Dr. Duluth, GA	(770)476-4765
		5032 N. Royal Atlanta Dr.	

1097	Moon, Sang Hee	Tucker, GA	(770)938-5020
1098	Moon, Yang Mi	610 Lendl Ln. Lawrenceville, GA	(678)376-6141
1099	Moon, In Kee	1710 McDowell Ct. Lawrenceville, GA	(770)963-4805
1100	Moon, Il Woong	2320-3 Lawrenceville Hwy. Decatur, GA	(404)634-8382



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Final Projects for Advanced Concepts in Electronic and optoelectronic devices.

Outline.

- Final Project Guidelines
- Final Project Description
- Proposed projects
- Examples of projects from related courses

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Final Project Guidelines

- Teams of 1, 2 or 3
- Suggested topics provided
- Link to research is encouraged

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Final Project Description

- 1. A brief history of the subject, including important milestones, dates, names of principal contributors.
- 2. Review of the state-of-the-art .
- 3. Comments on controversies, if any.
- 4. Author's own thoughts, calculations, estimates, suggestions, etc.
- 5. Suggestions for further studies.
- 6. Key references.
- 7. Index.
- 8. Suggested size around 10 pages

3

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Proposed Topics

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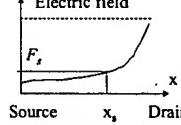
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Field scaling in CMOS

- Perform device simulations for deep submicron n-MOS and p-MOS
- Interpolate the field profile using the analytical equation given above

• Determine the relationship between β , d_{ar} , L , etc.

• Electric field



Source x_s Drain

Project #1

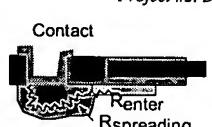
$$F(x) = \frac{V_a}{\beta} \exp\left(\frac{\Delta x}{\beta}\right)$$
$$V_a = F_s \beta$$

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Series resistance MOS

Project #2. Background



$$R_{\text{enter}} = \frac{4\rho}{\pi W} \ln \frac{r_j}{2r_{ch}}$$

ρ is contact region resistivity
 W is the device width
 r_j is the contact depth
 r_{ch} is the channel thickness

From S. J. Hillenius, MOSFETs and Related Devices, in S. Sze, Editor, Modern Semiconductor Devices, Wiley, 1998

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Project #2 (continued)

- Perform numerical simulation in order to check the analytical equation for R_s .
- Scale the gate length, L, from 1 μm to 0.1 mm (using 3 to 4 different values of L). Check how R_s scales with L. Compare with the analytical equation for R_s .

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Substrate leakage

Project #3

- Choose a reasonable design for a 0.25 μm gate n-channel Si MOSFET. Using a numerical device simulator, calculate the substrate leakage for a substrate bias of -1 V as a function of temperature. Compare with analytical estimates
- Comment on potential improvements for GaAs, SiC, and GaN FETs (from the point of view of a smaller leakage current)

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Si lessons for GaN technology

Project #4

- Review the present state-of-the-art for GaN FETs
- Discuss which design ideas from Si MOSFETs can apply to GaN FETs
- Any ideas for an improved geometry?

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GaN versus Si and GaAs

Project #5

- Possible advantages - temperature range, high frequency applications, high power?
- Integration with Si - possible applications

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Organic TFTs

Project #6

- Compare the I-V characteristics of organic TFTs reported in literature with Si, poly-Si, and a-Si technology
- Predict the scaling to smaller sizes
- Identify problems and comment on the potential of this emerging technology for display applications

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Packaging Roadmap

Project #7

- Use the power dissipation predicted by Roadmap-97 in order to identify potential package problems
- Review proposed solutions (such as "active packaging")

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Roadmap-97 - are there bumps and potholes along the way?

Project #8

- Critique Roadmap-97 - what technologies must be developed to follow the roadmap and how soon
- Comment on the role of new emerging materials systems and alternative technologies (Si-Ge, wide band, organic TFTs, etc.)

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Interconnects

Project #9

- Using AIM-Spice simulations investigate the effects of interconnects on different technologies (Si, GaAs MESFETs, AlGaAs-GaAs HEMTs, poly-Si, etc.)
- Comment on the role of copper interconnects, low-K dielectrics, optical interconnects in light of the simulation results

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SOI technology

Project #10

- State-of-the-art
- Problems
- Scaling
- Cost versus performance

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High Speed Semiconductors

Project #11

- Discuss material properties of known semiconductors from the point of view of their potential applications in high speed devices. What criteria would you use for a "high speed" material - electron velocity? breakdown field? thermal conductivity? How are they combined into "figures of merit"?
- What are other important properties? An ability to form a heterostructure? Possibility of controlled doping? Demonstrating a p-n junction? Schottky barrier junction? Optoelectronic properties?

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Gate Leakage Current - GaAs Digital Technology Bottleneck?

Project #12

Discuss the role of the gate leakage. Using AIM-Spice models, demonstrate the gate leakage current effect on both I-V characteristics and on inverter characteristics. Discuss possible solutions. Suggest in-situ characterization techniques for the gate leakage current. Discuss scaling of gate leakage with device length.

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GaAs Digital FETs Operating at Cryogenic Temperatures

Project #13

Analyze factors limiting cryogenic performance. Why not silicon? Compare with data in literature. Develop reasonable MESFET AIM-Spice model for 4K and simulate inverter characteristics representative for this temperature range of operation.

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High Power FETs

Project #14

Discuss factors limiting maximum power
Field Effect Transistors as functions of frequency. Analyze self-heating effects.
Consider contacts and packaging.
Suggest system applications for different power levels.

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Project Teams and Project Titles from related courses

Suk Hoon Ku, Yan Ming Gao Yu Huang, Seong Yoel No,
SiC HBT JianYu Deng
MESFETs and HEMTs.

Shivananda S Shetty, Zheng Xu
Biagio Gallo, Ling Wang GaAs MESFET temperature
MESFET Scaling effect for Digital
Microelectronics

Michael Cornelius, Andrew Dickens
SiGe technology application

Tom Krawczyk, Matt Rajesh Gupta
Ernest, Rupal Patel Novel CMOS for low power
Steve Carlough, SiGe technology

20

Ryan Kelley

From: Mail Delivery Subsystem [MAILER-DAEMON@ece.gatech.edu]
Sent: Wednesday, July 30, 2003 5:40 PM
To: Ryan Kelley
Subject: Warning: could not send message for past 4 hours

EXHIBIT "G"

ATT841309.txt (394 FW: Georgia Tech
B) Patent Filing...

** THIS IS A WARNING MESSAGE ONLY **
** YOU DO NOT NEED TO RESEND YOUR MESSAGE **

The original message was received at Wed, 30 Jul 2003 11:24:52 -0400 (EDT) from
bigzilla.ece.gatech.edu [130.207.225.103]

----- Transcript of session follows ----- <yoelno@eurosport.com>... Deferred:
Connection timed out with freemail.eurosport.com.
Warning: message still undelivered after 4 hours
Will keep trying until message is 5 days old

Ryan Kelley

From: Ryan Kelley
Sent: Wednesday, July 30, 2003 11:25 AM
To: syn@ece.gatech.edu
Subject: FW: Georgia Tech Patent Filing

Seong:

Georgia Tech is filing a US patent application on Dr. Farrokh Ayazi's invention (entitled "Method of Batch Fabrication for SOI-Based Capacitive Single Crystal Silicon Micro-Electro-Mechanical Resonators With Self-Aligned, Nanometer In Size, Vertical and Lateral Transduction Gaps"), which you worked on while you were here. Dr. Ayazi has determined that you are an inventor. We need information from you, including your country of residence and permanent address. Please contact me to supply this information.

Thanks,

Ryan Kelley

Ryan Kelley
Technology Marketing Assistant
Georgia Institute of Technology
Atlanta, GA 30332-0415
404.385.2723

Ryan Kelley

From: System Administrator
To: 'syn73@excite.com'
Sent: Tuesday, July 29, 2003 9:08 AM
Subject: Undeliverable: Georgia Tech Patent Filing

Your message did not reach some or all of the intended recipients.

Subject: Georgia Tech Patent Filing
Sent: 7/29/2003 9:08 AM

The following recipient(s) could not be reached:

'syn73@excite.com' on 7/29/2003 9:08 AM

There was a SMTP communication problem with the recipient's email server. Please contact your system administrator.
<gtrc.gtrc.ad.gatech.edu #5.5.0 smtp;550 <syn73@excite.com>: User unknown in local recipient table>

Ryan Kelley

From: Ryan Kelley
Sent: Tuesday, July 29, 2003 9:08 AM
To: syn73@excite.com
Cc: Ryan Kelley
Subject: Georgia Tech Patent Filing

Seong:

Georgia Tech is filing a US patent application on Dr. Farrokh Ayazi's invention (entitled "Method of Batch Fabrication for SOI-Based Capacitive Single Crystal Silicon Micro-Electro-Mechanical Resonators With Self-Aligned, Nanometer In Size, Vertical and Lateral Transduction Gaps"), which you worked on while you were here. Dr. Ayazi has determined that you are an inventor. We need information from you, including your country of residence and permanent address. Please contact me to supply this information.

Thanks,

Ryan Kelley

Ryan Kelley
Technology Marketing Assistant
Georgia Institute of Technology
Atlanta, GA 30332-0415
404.385.2723

EXHIBIT "H"

Mail Code 025C

GEORGIA)
FULTON COUNTY) SS.
) EMPLOYMENT AGREEMENT
) Providing for the Assignment and
) Administration of Intellectual Properties

This instrument constitutes an agreement between the Board of Regents of the University System of Georgia, ("Board of Regents") and SCOTT YOUNG No. (Name),
(Title), Electrical and Computer Engineering
(Department), 273-471-0230 (S.S.#) employee of the Georgia Institute of Technology, ("Employee") covering his/her period of employment. For and in consideration of the employment of the Employee by the Georgia Institute of Technology ("Institute") under the authority of the Board of Regents, Employee agrees to the following:

I. Intellectual Property Assignments

Employee agrees that, if during the period of employment he/she shall invent, discover, author or develop any new process, products, art, machine, method of manufacture, or composition of matter or any new hardware, firmware, or software technology or improvement thereof or work of authorship in connection with Employee's work at the Institute ("Intellectual Property"), he/she shall promptly and fully disclose to the officers of the Institute and the Georgia Tech Research Corporation ("GTRC") in writing such Intellectual Property, and, if requested to do so by GTRC, will at GTRC's expense and through an agent or agents selected by GTRC apply every endeavor to obtain letters patent, copyright or trademark registration or other protection of the United States and/or of any state or foreign countries covering such Intellectual Property ("Intellectual Property Protection"); and Employee hereby assigns to GTRC all right, title and interest in and to said Intellectual Property and/or such Intellectual Property Protection that is issued or maintained thereon, subject to the terms and conditions of the Institute's Patent, Copyright, Trademark and other intellectual property policies, and thereafter will execute all documents and do all things requested by the Institute or GTRC to further the securing of such Intellectual Property Protection. The legal expenses associated with each and every one of such actions, however, if such actions are requested by the Institute or GTRC are to be at the expense of GTRC, and Employee agrees that all such Intellectual Property and all forms of Intellectual Property Protection issued thereon shall belong to and be the property of GTRC.

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II. Maintenance and Availability of Notes

Employee further agrees to keep complete and systematic records and notebooks that are properly witnessed in writing, in accordance with the form approved by the Institute and GTRC, including notes on all experimental and research work, descriptions, diagrams and other data, pertaining to Intellectual Property made during Employee's period of employment, which memoranda shall be available during all normal working hours at the request of the Institute or GTRC. All aforesaid memoranda are to be and remain the property of GTRC.

III. Disclosure of Information

Employee further agrees not to disclose during his/her term of employment and thereafter for so long as may be deemed necessary and specified by the Institute, any proprietary/confidential information in reference to any project or intellectual property which Employee shall obtain or which shall come to his/her knowledge during his/her term of employment, unless specifically authorized in writing to do so by the Vice President for Research or his/her duly authorized representative, or unless publication or other means of

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By Mary C. L'ayres
Director or Designee
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EMPLOYEE

By Scot Zabel
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This day of , 19 .

GEORGIA TECH RESEARCH CORPORATION

By: Jilda Dichi Garton
Associate Vice Provost For Research
Name/Title And General Manager
Date: SEP 22 2000



August 14, 2003

CERTIFIED MAIL

Seong Yoel No
3830 Ancraft Circle
Norcross, Georgia 30092

Dear Mr. No,

Please contact the Georgia Tech Office of Technology Licensing as soon as possible, regarding signature requirement for a patent application. Our office need the following document signed to file an Utility patent application with the United States Patent and Trademark Office. Please either call or send a current address to our office where the documents can be sent.

If you have any questions regarding this matter, you may contact me at (404) 894-6287 or email me at zilla.higgs@gtrc.gatech.edu.

Sincerely,

A handwritten signature in black ink that reads "Zilla Higgs".

Zilla Higgs
Administrative Coordinator

zh

Cc: Ryan Kelly

Georgia Institute of Technology
Atlanta, Georgia 30332-0415 U.S.A.
PHONE 404.894.6287 FAX 404.894.9728
<http://www.gtrc.gatech.edu>